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6

<u>1. SCOPE OF PROCEDURE</u>

This is the Integrated System Test (IST) procedure for the *OM* Experiment.

It's scope is to verify

- all **OM** experiment functions and performance
- all functional interfaces within the experiment and to the S/C

after the experiment has been successfully integrated into the XMM S/C.

The procedure defines:

- the test conditions
- necessary test preparation steps
- step by step test sequence for each test case
- necessary post processing and evaluation steps

Each test case and each test step contains fields to note the pass/fail result and all relevant information occurring during the test.

When testing has been completed, the filled-in test procedure will establish the sub-system Test Report.

Please note, that this version of the document is based on XMM-OM/MSSL/SP/0194.7. It comprises, however, additional changes which are not contained in that reference document. These changes are highlighted by **bold characters**.

Please note further, that the High Voltage test sequences (Imaging Full Frame and Multiple Image, Test Sequence 11 and 12) will not be performed as part of the nominal IST.

2. APPLICABLE DOCUMENTS

In the event of conflict between higher level documents referenced and this test procedure, the higher level documents shall have precedence.

2.1. General Documents

- XOIRD
- PX-RS-0023
- EID-B's
- System Verification Programme Plan
- Configuration Management Plan
- Environmental Design and Test Requirements Specification
- XMM Users Manual (XUM)
- AIT and Resources Plan
- Product Assurance Requirement Specification
- XMM-OM/MSSL/SP/0194.7, April 99 (OM-FM Integrated Functional Test Procedure)
- XMM-OM/MSSL/SP/0169.2, 4.7.98 (Acceptance Data Package)

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2.2. Documentation in Checkout Area

Following documentation must be available in the C/O area during the IST:

- SAS Operation and Maintenance Manual
- TT&C SCOE Users Manual
- AOCS SCOE Users Manual
- BAT SCOE Users Manual
- PYRO SCOE Users Manual
- OCOE Functional Test Procedure
- FPA SCOE Users Manual
- OBDH Frontend Users manual

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3. DESCRIPTION OF TEST OBJECTIVE

The **OM** IST shall demonstrate that the experiment and its interfaces are working together as an integral part of the spacecraft by verifying all experiment functions, its performance, and the functional interfaces.

The test is split into test cases as shown below. Each of the cases is run by a Test Sequence, which may call lower level Test Sequences. Detailed information on the individual Test Sequences may be found in the EGSE User Manual.

This IST comprises:

- all experiment functions and performance
- all functional interfaces within the experiment and towards the S/C
- tests on all redundant or cross strapped branches
- end to end verification of all sensors including sensor external stimulation and polarity checks
- experiment power consumption for each operating mode.

The **OM** test cases must be run in the prescribed order. The order in which they are run must be recorded in the test execution summary sheet.

Test Cases which cannot be executed due to missing of other H/W or S/W on the S/C, because they are not yet integrated at this stage of the AIT programme, shall be identified and will be conducted during the so-called Delta IST.

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3.1. Description of Test Flow for FM

3.1.1. Test Sequence 1: Switch-on (prime or redundant)

Description

Switch-on procedure for the OM (prime or redundant). Switch-on the OM prime power and prime keep-alive line and check for HK data

Initial state

The OM is switched off (KAL prime can be on).

Final State

The OM (prime or redundant) is switched on and in basic mode.

Safety precautions

The Filter wheel is a limited life time device. Each rotation of the filter wheel (which occurs every time the OM is switched on) must be recorded in the instrument log book for the flight model.

3.1.2. Test Sequence 2: Basic Mode Test

Description

The function of the OM is tested in the basic mode test without loading the main application software (operational mode).

Dump IC memory and verify the operation of the KAL memory.

Initial state

The OM (prime or redundant) is switched on and in basic mode

Final State

The OM (prime or redundant) is switched on and in basic mode.

Safety precautions

none

3.1.3. Test Sequence 3: DMA Test

Description

This test verifies that data can be loaded via low level patch and dump commands.

Initial state

The OM (prime or redundant) is switched on and in basic mode

Final State

The OM (prime or redundant) is switched on and in basic mode.

Safety precautions

none

3.1.4. Test Sequence 4: Time Synchronisation Test

Description

This test verifies the time synchronisation between CDMU and OM.

Initial state

The OM (prime or redundant) is switched on and in basic or in operational mode.

Final State

The OM (prime or redundant) is switched on and in the same mode as in the initial state.

Safety precautions

none

3.1.5. Test Sequence 5: Operational Mode Test

Description

The function of the OM is tested in the operational mode test. Switch on secondary rail of OM-1 and test operation. Test operation of DPU.

Initial state

The OM (prime or redundant) is switched on and in basic mode.

Final State

The OM (prime or redundant) is switched on and in operational mode.

Safety precautions

None

3.1.6. Test sequence 6: Filter Wheel Control Test

Description

The function of the OM filter wheel operation is tested in operational mode. Command search for coarse sensor. Command search for datum position.

Initial state

The OM (prime or redundant) is switched on and in operational mode

Final State

The OM (prime or redundant) is switched on and in operational mode with filter wheel in datum position.

Safety precautions

The Filter wheel is a limited life time device. Each rotation of the filter wheel must be recorded in the instrument log book for the flight model.

3.1.7. Test sequence 7: Dichroic Control Test (beam deflector)

Description

XMM

The function of the OM dichroic (beam deflector) is tested in engineering mode Command dichroic to rotate to redundant. Command dichroic to rotate to prime.

Initial state

The OM (prime or redundant) is switched on and in an operational mode (safe, idle, science or engineering).

Final State

The OM (prime or redundant) is switched on and in idle mode. The dichroic is at 'prime' interface position.

Safety precautions

This test procedure should be reviewed by OM personnel before first execution.

The Dichroic is a limited life time device. Each movement of the dichroic wheel must be recorded in the instrument log book for the flight model instrument.

3.1.8. Test sequence 8: Heater Control Test

Description

The function of the heaters is tested in operational mode. Each of the four main heaters are cycled on/off in turn.

Initial state

The OM (prime or redundant) is switched on and in operational mode.

Final State

The OM (prime or redundant) is switched on and in operational mode.

Safety precautions

None

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3.1.9. Test sequence 9: Image Acquisition Test -Multiple Window (High Voltage OFF)

Description

XMM

The function of the OM Image acquisition is tested in operational mode. A full image will be acquired and dumped to the instrument workstation. Only those areas enabled in the window table should contain events.

Initial state

The OM (prime or redundant) is switched on and in an operational mode. OM-1 secondary rails are switched on.

Final State

The OM (prime or redundant) is switched on and in idle mode.

Safety precautions

The Filter wheel is a limited life time device. All movements of the filter wheel (such as occur in this test) must be recorded in the instrument log book for the flight model.

3.1.10. Test sequence 10: Image Acquisition Test -Full Frame (High Voltage OFF)

Description

The function of the OM Image acquisition is tested in engineering mode. A full frame image will be acquired and dumped to the instrument work station.

Initial state

The OM (prime or redundant) is switched on and in an operational mode (safe, idle, science or engineering).

OM-1 secondary rails are switched on.

Final State

The OM (prime or redundant) is switched on and in engineering mode.

Safety precautions

The Filter wheel is a limited life time device. All movements of the filter wheel (such as occur in this test) must be recorded in the instrument log book for the flight model.

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3.1.11. Test sequence 11: Image Acquisition Test -Multiple Window (High Voltage ON)

Description

XMM

The function of the OM Image acquisition is tested in operational mode. A full image will be acquired and dumped to the instrument workstation. Only those areas enabled in the window table should contain events.

Initial state

The OM (prime or redundant) is switched on and in an operational mode. OM-1 secondary rails are switched on.

Final State

The OM (prime or redundant) is switched on and in idle mode.

Safety precautions

Operation of the high voltage unit must only be performed when OM personnel are present and only in a controlled environment - irreparable damage of the detector can occur.

The Filter wheel is a limited life time device. All movements of the filter wheel (such as occur in this test) must be recorded in the instrument log book for the flight model.

3.1.12. Test sequence 12: Image Acquisition Test -Full Frame (High Voltage ON)

Description

The function of the OM Image acquisition is tested in engineering mode. A full frame image will be acquired and dumped to the instrument work station.

Initial state

The OM (prime or redundant) is switched on and in an operational mode (safe, idle, science or engineering).

OM-1 secondary rails are switched on.

Final State

The OM (prime or redundant) is switched on and in engineering mode.

Safety precautions

Operation of the high voltage unit must only be performed when OM personnel are present and only in a controlled environment - irreparable damage of the detector can occur.

The Filter wheel is a limited life time device. All movements of the filter wheel (such as occur in this test) must be recorded in the instrument log book for the flight model.

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3.1.13. Test sequence 13: Switch-off

Description

Mode and state are checked and the appropriate procedure is followed to switchoff in an orderly way.

Initial state

The OM (prime or redundant) is switched on.

Final state

The OM (prime or redundant) is switched off. The KAL power lines may be left on.

Safety precautions

none

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4. NCR AND SCR STATUS LIST

NCR Title	Reference Paragraph	Open Date	PA
		NCR Title Reference Paragraph	NCR Title Reference Paragraph Open Date Image: Image of the second seco

SCR No.	SCR Title	Reference Paragraph	Open Date	PA

Project:

XMM

Sheet:

5. PROCEDURE VARIATION SHEET

Dorograph	Description of Variation	Signatures			Action Required		
Paragraph	(Reference to Continuation sheets)	тс	PA	ESA	(Reference to NCR		

Project:

Sheet:

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TEST PROCEDURE 6.

General:

XMM

All test activities shall be performed in accordance with the test procedure.

Procedure Variation Sheet:

Any change to the approved procedure shall be only recorded on the procedure variation sheets and approved by the test conductor. All changes shall be justified and agreed prior to the event and last minute changes shall be discovered. All change requests shall be subject to configuration control, if flight H/W or S/W is involved.

PA-Requirements:

During the test activities strict PA control must be applied. Strict adherence to the procedure shall be verified by PA inspection.

Non Conformance Reports (NCR's):

Any anomaly or discrepancy between procedure and results shall be the cause of a NCR. The NCR must be raised immediately and a MRB must be held before the test can be continued. Each NCR have to be noted in the NCR Table in chapter 5.

Also the discrepancies which are thought to be caused by software, shall be dealt with NCR's.

Preparation of Tests:

Prior to the start of any test, the contractor must ensure that:

- The test procedure is reviewed and approved by ESA.
- all necessary GSE is available, test instrumentation properly installed and calibrated, and test facility ready and in good working condition. Any log books kept up to date.
- the test configuration with all necessary MGSE/EGSE properly established
- all test personal are ready and proper precautions are taken to avoid accidents which may be harmful to personnel and/or the spacecraft.

Execution of Tests:

During the test, the test conductor shall ensure that:

- the test proceeds according to the procedure
- all communications between the test personal are routed through the accepted communication channels and are in the agreed working language of the project
- deviations from the procedure can only be made when a signed off Procedure Variation Sheet or a NCR/MRB disposition can be presented, otherwise PA has the right to stop the test. To avoid any critical status of the system under test, a sequence must be available to bring the system in a non-critical status until the situation has be cleared. A non-conformance-report has to be raised, if the procedure is not to be followed.
- There is continuous monitoring of the S/C status by QA personnel and the test conductor of his substitute at any time the S/C is switched ON.
- At test step execution the version/revision number and the checksum of the Test Sequences shall be noted down together with the start/end time.
- The OK / NOT OK status shall be noted for each step

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	record	alies during test run (e.g. errors, TS	
	 all ste all ste all nec no act succes 	ests: npletion of the test, the test conductor mups in the procedure are completed ps required for the Post Processing are per cessary printouts for the test report are contion remaining open through NCR's that soful completion of the test. ponsible engineers sign the declaration sh	erformed ollected at would invalidate the
	Simulation shall be he	the (but after preparation) and after a, test readiness reviews (TRR) and po- eld. The purpose of the reviews is to ensu- ements are met.	ost test reviews (PTR)
	intercommunication	Il test related directions or replies have t on system of the OCOE in English langu ubstitute who fills in the master procedur	age, chaired by the test

Sheet:

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6.1. General Test Conditions Applicable to all Test Cases.

Checkout Room

XMM

Environmental	Nominal	Actual	Р	Ν
Cleanliness	ambient			
Temperature	17-23°C			
Relative	40-60°%			
Humidity				
Pressure	Ambient			

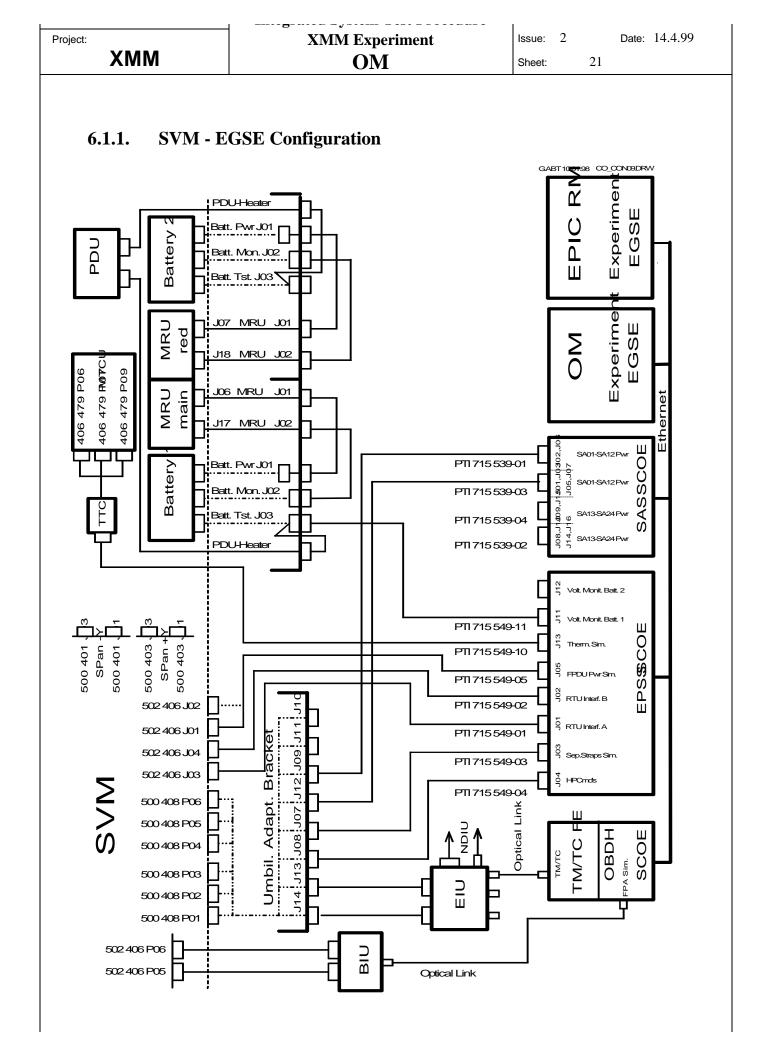
Clean Room

Environmental	Nominal	Actual	P	Ν
Cleanliness	100.000			
Temperature	17-23°C			
Relative	40-60°%			
Humidity				
Pressure	Ambient			

Mechanical:

During Experiment testing , any movement of MGSE is not allowed.

Electrical:



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6.1.2. FPA - EGSE Configuration

Not applicable for FM

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6.1.3. EGSE S/W setup + configuration

The S/W configuration used for this test is documented in :

XM-PR-DOR-0049 issue:

roject:		XMM Experi	ment	Issue:	2	Date:	14.4.99
XMI	Μ	OM		Sheet:	24		
6.1.4.	S/C Conf	iguration					
The	spacecraft	has to be switched to	'Bas	sic Test M	ode'.		
Run	Control Fil	e:	'X_N	10D_0FF2	2BTM'		
				11	- 1		
maint	tained by PA	configuration status of the shall be attached to section		ll serial nun	nbers, etc.	as	
maint 6.1.5.	tained by PA Special T	shall be attached to section Sest Equipment	8.			as	
maint 6.1.5.	tained by PA Special T	shall be attached to section	8.			as	
maint 6.1.5.	tained by PA Special T	shall be attached to section Sest Equipment	8.			N	ext

No.	Item	Manufact.	Model No.	Serial No.	Inv./PTI	Next
					No.	Calibration

6.1.6. Safety Precautions

- The handling of the test set-up shall be in accordance with controlled procedure only
- Handling, mechanical and electrical, has to be done only by qualified personnel as defined in the AIT-Plan.
- All connectors have to be covered with dust caps when not mated.
- All optical sensors shall be protected by covers except when stimulated.
- Pyrotechnic devices are only installed when unavoidable and in safe condition.
- Test item has to be switched-off when changing Test Configuration.
- All test personnel which must have access to the S/C, have to wear anti static shoes and clothes.
- The cleanroom floor around and under the item under test shall be covered with an anti static carpet, which is grounded to facility ground. Not applicable for Dornier Integration Facility which provides conductive floor.
- Radioactive Sources n/a for OM
- Pyrotechnics

Safe/Arm Plugs at the Skin Connector Bracket are exchanged against Pyro Pulse Detector Harness.

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6.2. TestSequence 0: Configuration of OM and EGSE for IST

This test is performed automatically by executing the Test Sequence:

EHM_CONFIG

6.2.1. Test Description

Description

This sequence configures the EGSE for the test and allows to select for prime or redundant side of the OM experiment operation. The test sequence is alos used to make seetings for the Radiation Monitor experiment but these settings will be disregarded in the subsequent IST test steps for this OM IST.

Initial state

The S/C is switched to Basic Test Mode BTM

Final State Same as initial state.

Safety precautions None

6.2.2. Error Handling

Verification of tests is done automatically by the Test Sequence. In case of error, information on the error is logged in the TSLOG in the form

>>>> ERROR: <Error Message>

A message is displayed in both the TS-Log Window and the TS-Control Window. The Test Sequence is 'HALT'ed for the operator to indicate the action to be taken (Continue or Abort).

WARNING!

In all cases, when an error is encountered, authorised personnel (e.g. Test Manager) **MUST** be consulted, before the test is resumed or aborted.

Correct status manually or stop TS

To continue from this point the operator has to click the 'CONT' button. No corrective action is done by the Test Sequence when continued unless explicitly stated in the message.

Any abortion of the Test Sequence will leave the Spacecraft in an undefined state.

Project:	Μ	XMM Experiment OM	Issue: 2 Sheet: 26	Date: 14.4.99
6.2.3.	Execution:	Configuration Sequence		
	ez	xecute:.EHM_CONFIG.TS		

ect: XMM	X	XMM Experiment OM	Issue: 2 Sheet:	Date: 14.4.99
6.2.4. Т	festresult Prime Br	anch EHM_	CONFIG	
Date	Expected Time	Start Time	End Time	Test Execut
	5 min			OK NOK
Comments:				
comments.				
This Tes	t Case has been success SCR's or Procedure Var	fully performed, all c	ppen issues are covere Test Printouts are any	d by pexed
to the Pr	ocedure.			
S/S R	esp Test Cond.	PA	ES. Represe	A ntative
		Date:	Date:	
Date:				

Date	Expected Time	Start Time	End Time	Test OK	Execut NOK
Comments:					
Comments:					

Sign.:

Sign.:

Sign.:

Project:

Sheet:

29

6.3. TestSequence 1 : Switch-On (Prime or Redundant)

This test is performed automatically by executing the Test Sequence:

EHMOD PWR ON

6.3.1. **Test Description**

Description

XMM

Switch-on procedure for the OM (prime or redundant). Switch-on the OM prime power and prime keep-alive line and check for HK data

Initial state

The OM is switched off (KAL prime can be on).

Final State

The OM (prime or redundant) is switched on and in basic mode.

Safety precautions

The Filter wheel is a limited life time device. Each rotation of the filter wheel (which occurs every time the OM is switched on) must be recorded in the instrument log book for the flight model.

6.3.2. **Error Handling**

Verification of tests is done automatically by the Test Sequence. In case of error, information on the error is logged in the TSLOG in the form

>>>> ERROR: <Error Message>

A message is displayed in both the TS-Log Window and the TS-Control Window. The Test Sequence is 'HALT'ed for the operator to indicate the action to be taken (Continue or Abort).

WARNING!

In all cases, when an error is encountered, authorised personnel (e.g. Test Manager) MUST be consulted, before the test is resumed or aborted.

Correct status manually or stop TS

To continue from this point the operator has to click the 'CONT' button. No corrective action is done by the Test Sequence when continued unless explicitly stated in the message.

Any abortion of the Test Sequence will leave the Spacecraft in an undefined state.

Project:

XMM

30

Execution: Switch On Prime/Redundant 6.3.3.

execute:.EHMOD_PWR_ON.TS

Step	Action	TC/TM	Remarks	Prim	Red
0	Initial State:				
	OM 28V power switched off				
	KAL line on				
1	Switch-on OM power		Filter wheel to coarse		
1.1	Switch-off the S/C heater (if not switched off before)		S/C procedure		
1.2	Switch-on 28V		S/C procedure		
1.3	Switch-on KAL (if not switched		S/C procedure		
1.0	on before)				
2	Check Housekeeping		(HK Valid after 15		
2.1	Ensure HK monitor prog working		second)		
2.2	Verify basic mode is operational	90000			
2.3	Verify heaters are on		pref H5395 = 'Initial'		
	Secondaries disabled		pref H5240 ='ononoffoff'		
			pref H5255 = 'Disabled'		
3	OM power				
3.1	measure OM +28V voltage and		S/C procedure		
	current		report: voltage and current		
3.2	Measure OM KAL voltage and		S/C procedure		
	current		report: voltage and current		
3.3	Compare with table 5.0-1				
4	Exit				

Power line	Voltage	Current
+28V main power	+28V +/- 2V	1880mA +/- 50mA
Keep Alive Line	+8V +/- 1V	<18mA

Table 5.0-1: OM power consumption (basic mode)

XMM		KMM Experiment OM	Issue: 2 Sheet:	Date: 14.4.99
6.3.4. Т	Sestresult Prime Br	anch EHMC	DD_PWR_ON	
Date	Expected Time	Start Time	End Time	Test Execut
				OK NOK
Comments:				
~~~~~~				
This Tes NCR's, S to the Pr	t Case has been success SCR's or Procedure Var ocedure.	fully performed, all o riations. All required	pen issues are covere Test Printouts are an	ed by nexed
S/S R	esp Test Cond.	PA	ES. Represe	A ntative
Date:		Date:	Date:	
Sign.:		Sign.:	Sign.:	I

oject:	Σ	XMM Experiment	Issue: 2	Date: 14.4.99
XMM		OM	Sheet:	32
6.3.5. T	estresult Redunda	nt Branch EHMO	D_PWR_ON	
Date	Expected Time	Start Time	End Time	Test Execute
				OK NOK
Comments:				
comments.				

This Test Case has been successfully performed, all open issues are covered by NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.

S/S Resp Test Cond.	PA	ESA Representative
Date:	Date:	Date:
Sign.:	Sign.:	Sign.:

33

Sheet:

# 6.4. Test Sequence 2: Basic Mode Test

This test is performed automatically by executing the Test Sequence:

## EHMOD_BOOT_TEST

## 6.4.1. Test Description

#### Description

XMM

The function of the OM is tested in the basic mode test without loading the main application software (operational mode).

Dump IC memory and verify the operation of the KAL memory.

#### Initial state

The OM (prime or redundant) is switched on and in basic mode

#### Final State

The OM (prime or redundant) is switched on and in basic mode.

#### Safety precautions

none

## 6.4.2. Error Handling

Verification of tests is done automatically by the Test Sequence. In case of error, information on the error is logged in the TSLOG in the form

>>>> ERROR: <Error Message>

A message is displayed in both the TS-Log Window and the TS-Control Window. The Test Sequence is 'HALT'ed for the operator to indicate the action to be taken (Continue or Abort).

## WARNING!

In all cases, when an error is encountered, authorised personnel (e.g. Test Manager) **MUST** be consulted, before the test is resumed or aborted.

#### Correct status manually or stop TS

To continue from this point the operator has to click the 'CONT' button. No corrective action is done by the Test Sequence when continued unless explicitly stated in the message.

Any abortion of the Test Sequence will leave the Spacecraft in an undefined state.

# execute: EHMOD_BOOT_TEST.TS

Step	Action	TC/TM	Remarks	Pass	Notes
0	Initial State: OM is switched on				
	and in				
	basic mode				
	KAL power line is on				
1	Check test command				
1.1	Send invalid command (tc_send)	TC(0,0)			
1.2	Check packet response	91202	TM (3,2)		
1.3	Check HK (bad TC counter)	90000	Pref H5390 = 1		
1.4	Send valid command (tc_test)	H1			
	Check packet response	91100	TM (3,1)		
	Check HK	90000	Pref H5385 = 1		
1.5	Send invalid sub-type (5,15)	TC(5,15)	TM 91203		
1.6	Send wrong checksum		TM91201		
1.7	Perform Time Synchronisation test				
	Prompt operator to perform test :				
2	Dump and verify KAL is OK				
2.1	Dump instruction space				
2.2	Address $0x3800 = $ Start	H4101	H500 = 0x3800		
2.3	Length = $20 (14 \text{ Hex}) \text{ Words}$		H510 = 0x14		
2.4	Compare contents:				
	85D0, <b>4A04</b> , 8320, 0906, B122	94201	ICU S/W issue 8 only		
	4820, 400E, 4800, 4009, 8520,				
	DD40, 4820, 2000, 4810, 2002,				
	B700, 0D00, 0D02, 0D04, 85F0				
3	IF memory contents is O.K the		If KAL OK skip ICU load		
	goto section <b>6.7.3</b> , step 1.3.				
	If memory contents is incorrect		IF KAL bad re-load ICU		
	goto section <b>6.7.3</b> , step 1.1.				

6.4.1. Testresult Prime Branch EHMOD_BOOT_TEST           Date         Expected Time         Start Time         End Time         Test           Comments:         OK         O		Date: 35	Issue: 2 Sheet:	XMM Experiment OM	2	XMM
OK         Comments:         This Test Case has been successfully performed, all open issues are covered by NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed		Г	D_BOOT_TEST	anch EHMO	estresult Prime Br	6.4.4. Te
Comments: This Test Case has been successfully performed, all open issues are covered by NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed	Execut	Test F	End Time	Start Time	Expected Time	Date
This Test Case has been successfully performed, all open issues are covered by NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed	NOK	ОК				
This Test Case has been successfully performed, all open issues are covered by NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed		-				
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed						Comments:
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed						
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed						
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed						
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed						
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed						
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed						
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed						
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed						
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed						
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed						
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed						
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed						
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed						
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed						
to the Procedure.		ed by	en issues are covere	fully performed, all or iations All required 7	Case has been success	This Test (
		IIUAUU	tot i initotio are alli	natons. 7 in required 1	cedure.	to the Proc
S/S Resp Test PA ESA Cond. PA Representative				ΡΛ	sp Test	S/S Res
Cond.RepresentativeDate:Date:		A	ES/	IA		C.
Sign.: Sign.: Sign.:		A ntative	Represe			
		A ntative	Represer	Date:		Date:

		1					
Project:	XMM Experiment	Issue:	2		Date:	14.4.99	
XMM	ОМ	Sheet:		36			

## 6.4.5. Testresult Redundant Branch EHMOD_BOOT_TEST

Date	Expected Time	Start Time	End Time	Test	Executed
				OK	NOK

**Comments:** 

This Test Case has been successfully performed, all open issues are covered by NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.

S/S Resp Test Cond.	PA	ESA Representative
Date:	Date:	Date:
Sign.:	Sign.:	Sign.:

XMM

6.5. Test Sequence 3:

commands without CRC.

**Test Description** 

EHMOD DMA TEST

**DMA Test** 

This test is performed automatically by executing the Test Sequence:

## 37 Sheet:

2

The OM (prime or redundant) is switched on and in basic mode The OM (prime or redundant) is switched on and in basic mode.

This test verifies that the CDMU can perform low level patch and dump on the OM memory. Please note, that the S/W patch which is uploaded in this test sequence is not only used for test purposes but is necessary to enable the OM to accept

## Safety precautions

none

6.5.1.

Description

Initial state

**Final State** 

#### 6.5.2. **Error Handling**

Verification of tests is done automatically by the Test Sequence. In case of error, information on the error is logged in the TSLOG in the form

>>>> ERROR: <Error Message>

A message is displayed in both the TS-Log Window and the TS-Control Window. The Test Sequence is 'HALT'ed for the operator to indicate the action to be taken (Continue or Abort).

> WARNING! In all cases, when an error is encountered, authorised personnel (e.g. Test Manager) **MUST** be consulted, before the test is resumed or aborted.

> > Correct status manually or stop TS

To continue from this point the operator has to click the 'CONT' button. No corrective action is done by the Test Sequence when continued unless explicitly stated in the message.

Project:	XMM Experiment	Issue:	2	Dat	te: 14.4.99
XMM	OM	Sheet:		38	

1

# 6.5.3. Execution: DMA Test

# execute: EHMOD_DMA_TEST.TS

Step	Action	TC/TM	Remarks	Pass	Notes
0	Initial state: OM switched on and		Pref H4505 = 'Basic'		
	KAL power line is on				
0.1	Disable watchdog in preparation				
	for RBI suspend	H6510			
1	Ensure that telecommand		EGSE procedure		
	checksumming is disabled				
2	Check command reception				
2.1	Send tc test command	H1	Test-command w.o. CRC		
2.2	Check packet response	91201	Incorrect checksum		
3.	Enable Telecommand		EGSE procedure		
	checksumming				
4.	Upload patch software				
4.1	Send RBI suspend command	D7203			
4.2	Load patch 5.2-1	raw-com.	C42=0x76E52,C43=10		
4.3	Dump and compare patch 5.2-1	D3921			
4.4	Load patch 5.2-2	raw-com.	C42=0x73C18,C43=2		
4.5	Dump and compare patch 5.2-2	D3921			
4.6	Send RBI go command	D7204			
4.7	Enable watchdog	H5510			
4.8	Check packet response	91100	Packet accepted		
4.9	Dump & compare patch 5.2-1	H4101	Address = $3729$ (hex)		
			Length = $10$ (dec)		
4.10	Dump & compare patch 5.2-2	H4101	Address = $1E0C$ (hex)		
			Length $= 2$		
5	Ensure that telecommand		EGSE procedure		
	checksumming is disabled				
6	Check command reception				
6.1	Send tc test command	H1	Test-command w.o. CRC		
6.2	Check packet response	91100	Packet accepted		
6.3	moved to 4.7				
6.4	moved to 4.8				
7.	Enable Telecommand		EGSE procedure		
	checksumming				
8	Exit				

Please note that the test command in step 2.1 must be rejected due to missing CRC. After uploading the S/W patch in step 4 the test command in step 6.1 shall be accepted.

Project:	XMM Experiment OM	Issue: Sheet:	2	39	Date:	14.4.99
Value E522 800D 0003 4A07						
3000           7503           7200           0655           7070           1E0E						

**Table 5.2-1 Non-volatile Patch** 

Value	
7070	
3729	

**Table 5.2-2 Volatile Patch** 

# Notes: S/C procedures

The values for the commands for the spacecraft procedures are as follows:

- TC(6,1), APID 129, MID = 2, Address =0007 6E52 (hex)
   TC(6,2), APID 129, MID = 2, Address = 0007 6E52 (hex), length = 10 (dec)
   TC(6,1), APID 129, MID = 2, Address = 0007 3C18 (hex)
   TC(6,2), APID 129, MID = 2, Address = 0007 3C18 (hex), length = 2

	I	OM	Sheet:	40
6.5.4. To	estresult Prime Br	anch EHM(	DD_DMA_TEST	
Date	Expected Time	Start Time	End Time	Test Execut
				OK NOK
Comments:				
Comments.				
This Test	Case has been success	fully performed all o	nen issues are cover	od by
NCR's, So	CR's or Procedure Van	riations. All required	Test Printouts are an	nexed
to the Pro	ocedure.			
S/S Re C	sp Test ond.	PA	ES Represe	A ntative
Date:		Date:	Date:	
1		Sign.:	Sign.:	
Sign.:		ě		

		1				
Project:	XMM Experiment	Issue:	2		Date: 14.4.99	
XMM	ОМ	Sheet:		41		

# 6.5.5. Testresult Redundant Branch EHMOD_DMA_TEST

Date	Expected Time	Start Time	End Time	Test	Executed
				ОК	NOK

**Comments:** 

S/S Resp Test Cond.	PA	ESA Representative
Date:	Date:	Date:
Sign.:	Sign.:	Sign.:

# 6.6. Test Sequence 4: Time Synchronisation Test

This test is performed automatically by executing the Test Sequence:

# E_MOD_SYNCTIME

# 6.6.1. Test Description

## Description

XMM

This test verifies the time synchronisation between CDMU and OM.

## Initial state

The OM (prime or redundant) is switched on and in basic or in operational mode.

#### **Final State**

The OM (prime or redundant) is switched on and in the same mode as in the initial state.

## Safety precautions

none

# 6.6.2. Error Handling

Verification of tests is done automatically by the Test Sequence. In case of error, information on the error is logged in the TSLOG in the form

>>>> ERROR: <Error Message>

A message is displayed in both the TS-Log Window and the TS-Control Window. The Test Sequence is 'HALT'ed for the operator to indicate the action to be taken (Continue or Abort).

## WARNING!

In all cases, when an error is encountered, authorised personnel (e.g. Test Manager) **MUST** be consulted, before the test is resumed or aborted.

Correct status manually or stop TS

To continue from this point the operator has to click the 'CONT' button. No corrective action is done by the Test Sequence when continued unless explicitly stated in the message.

		XMM Ex	P • • •	ssue: 2	Date: 14.4.99
	XMM	0	M s	Sheet:	43
6.0	6.3. Execution: Time	Synchroni	isation Test		
	execute	E_MOD	_SYNCTIME.TS		
	After execution of the proceed be performed via keyboard co			owing ste	eps shall
tep	Action	TC/TM	Remarks	Pass	Notes
	Enable SID90	H2003	<b>Pref H1200 = 0x90</b>		
	Wait 20 seconds				
	Check coarse time of ICU and	92220	pref H7680 (divide by		
	DPU heartbeat timestamp		1024 and compare)		
	Disable SID 90	H2004	Pref H1200 = 0x90		

XMM	X	KMM Experiment OM	Issue: 2 Sheet:	Date: 14.4.99
6.6.4. T	'estresult Prime Br	anch E_MO	D_SYNCTIME	
Date	Expected Time	Start Time	End Time	Test Execut
				OK NOK
Comments:				
Comments:				
Th: T. 4	Cose has been see	fully porformed 1 - 11	<b></b>	d her
NCR's, S	Case has been success CR's or Procedure Van	riations. All required	Test Printouts are an	ea by nexed
to the Pro	ocedure.			
S/S Re	esp Test Cond.	PA	ES	A
<b>C</b>		Date:	Represe	ntative
		Lutt.		
Date:		C!	<b>CI</b> •	
		Sign.:	Sign.:	

Project:	XMM Experiment	Issue:	2		Date:	14.4.99	
XMM	ΟΜ	Sheet:		45			

# 6.6.5. Testresult Redundant Branch E_MOD_SYNCTIME

Date	Expected Time	Start Time	End Time	Test	Executed
				ОК	NOK

**Comments:** 

S/S Resp Test Cond.	PA	ESA Representative
Date:	Date:	Date:
Sign.:	Sign.:	Sign.:

Sheet:

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#### 6.7. Test Sequence 5: **Operational Mode Test**

This test is performed automatically by executing the Test Sequence:

# EHIST OPERATION

#### 6.7.1. **Test Description**

## Description

XMM

The function of the OM is tested in the operational mode test. Switch on secondary rail of OM-1 and test operation. Test operation of DPU.

## Initial state

The OM (prime or redundant) is switched on and in basic mode.

#### **Final State**

The OM (prime or redundant) is switched on and in operational mode.

# Safety precautions

None

#### 6.7.2. **Error Handling**

Verification of tests is done automatically by the Test Sequence. In case of error, information on the error is logged in the TSLOG in the form

>>>> ERROR: <Error Message>

A message is displayed in both the TS-Log Window and the TS-Control Window. The Test Sequence is 'HALT'ed for the operator to indicate the action to be taken (Continue or Abort).

## WARNING!

In all cases, when an error is encountered, authorised personnel (e.g. Test Manager) MUST be consulted, before the test is resumed or aborted.

## Correct status manually or stop TS

To continue from this point the operator has to click the 'CONT' button. No corrective action is done by the Test Sequence when continued unless explicitly stated in the message.



XMM

# OM

Sheet:

47

#### **Execution: Operational Mode test** 6.7.3.

- 0

# execute:.EHIST_OPERATION.TS

Step	Action	TC/TM	Remarks	Pass	Notes
0	Initial state:				
	OM switched on and in basic mode				
	KAL power line is on				
1	Switch to operational mode				
1.1	Load main operational code				
	(< load_icu)	91100	File : 'load ICU'		
	(< loud_lou)	51100			
1.2	Check HK packet counter has	90000	Pref H5385 = $++1FC$ (hex)		
1.2	increased by <b>494</b> .	20000	Pref H5390 = $1(hex)$		
	increased by 494.		1101115390 = 1(110x)		
1.3	Start Operational mode	H9001	Pref H550 = $0,H650 = 0$		
1.5	Wait 20 s.	119001	110111330 = 0,11030 = 0		
	wan 20 s.				
1.4	Verify operational mode started	90000	Pref H5395 = 'Safe'		
1.5	Send test packet	H1	11c1 115555 - 5aic		
1.5	Check TM received (verify in	91100			
1.0		91100			
1.7	operational mode)	TC(15.2)			
1./	Send invalid type (15,3)	TC (15,3) TM91202	110015 15 110020 2		
1.0	Check TM received		H6015=15,H6020=3		
1.8	Send invalid sub-type	TC(5,15)	116015 5 116020 15		
1.0	Check TM received	TM91203	H6015=5,H6020=15		
1.9	Send wrong checksum	<b>T</b>			
	Check TM received	TM91201			
1.10	Enable SID FF	H2003	H1200=0xFF		
2	Verify OM-1 secondary rails on				
2.1	Measure OM +28V voltage and		S/C procedure		
	current		report: voltage and current		
2.2	Compare with table <b>5.4-3</b>				
3	Check Housekeeping	90000			
3.1	+25V secondary rail current		Compare values with table		
3.2	+15V secondary rail current		5.4-1 for prime or table 5.4-		
3.3	+11V secondary rail current		2 for redundant		
3.4	+5.3V secondary rail current				
3.5	-5.3V secondary rail current				
3.6	-15V secondary rail current				
3.7	RBI status		Pref H5340 = $1014$ (hex)		
3.8	Perform Time Synchronisation test				
4	Test DPU (start-up sequence)				
4.1	Send DPU reset (tc_reset_dsp)	H7201			
4.2	Check TC received	91100	'Packet accepted'		
		92201	DA_DPU_BOOT_READY		
4.3	Examine HK heart beat count	90000	Pref H5410 (incrementing		
4.5	Examine TIK heart beat count	90000	every 10 seconds)		
	Only for full functional test				
4.4	Load DPU code procedure		Ref: DPU Load Script		
4.4			Kei. DFU Luad Script		
1 =	(< load_dpu <b>947</b> packets)	117202			
4.5	Send Load DPUOS	H7202			
4.6	Check TC Received	91100	'Packet received'		
		92202	'DPU OS ready'	1	1



XMM

Date: 14.4.99

Sheet:

48

1: Step 4.4, 4.5 and 4.6 should only be followed when performing a full functional test.

0

Rail	PREF	Value
+25V secondary	H5280	16mA < n < 23mA
+15V secondary	H5285	39  mA < n < 54 mA
+11V secondary	H5290	87 mA < n < 96 mA
+5.3V secondary	H5295	393 mA < n < 541 mA
-5.3V secondary	H5300	368mA < n < 506mA
-15V secondary	H5305	43mA < n < 60mA

**Table 5.4-1 Prime Secondary Currents** 

Rail	PREF	Value
+25V secondary	H5280	15 mA < n < 22 mA
+15V secondary	H5285	36Ma < n < 50mA
+11V secondary	H5290	77 mA < n < 107 mA
+5.3V secondary	H5295	391 mA < n < 539 mA
-5.3V secondary	H5300	360 mA < n < 495 mA
-15V secondary	H5305	41 mA < n < 58 mA

Table 5.4-2 Redundant Secondary Currents

Power Rail	Voltage	Current
+28V line	+28V +/- 2V	810 (offoffoff) - 2550 (ononoffoff) +/-50
Keep Alive Line	+8V +/- 1V	8mA +/- 5mA

Table 5.4-3 OM power consumption (with OM-1 secondaries on)

XMM	2	XMM Experiment OM	Issue: 2 Sheet:	Date: 14.4.9
6.7.4. Т	'estresult Prime Br	anch EHIST	C_OPERATION	
Date	Expected Time	Start Time	End Time	Test Execu
	20 min			OK NOK
Comments:				
Comments:				
NCR's, S	t Case has been success CR's or Procedure Var	fully performed, all criations. All required	open issues are covere Test Printouts are an	ed by nexed
to the Pro	oceaure.			
S/S Resp Test Cond.		PA	ES.	A
1		Data	<b>Represe Date:</b>	ntative
Date:		Date:	Date.	

Project:	XMM Experiment	Issue:	2	ſ	Date: 14.4.99	
XMM	ΟΜ	Sheet:		50		

# 6.7.5. Testresult Redundant Branch EHIST_OPERATION

Start Time   End Time   Test Executed	
OK NOK	

**Comments:** 

S/S Resp Test Cond.	PA	ESA Representative
Date:	Date:	Date:
Sign.:	Sign.:	Sign.:

		1				
Project:	XMM Experiment	Issue:	2	D	ate:	14.4.99
XMM	OM	Sheet:		51		

# **6.8.** TestSequence 6 : Filter Wheel Control Test

This test is performed automatically by executing the Test Sequence:

# EHIST_FWL_TEST

# 6.8.1. Test Description

#### Description

The function of the OM filter wheel operation is tested in operational mode. Command search for coarse sensor. Command search for datum position.

#### Initial state

The OM (prime or redundant) is switched on and in operational mode

#### Final State

The OM (prime or redundant) is switched on and in operational mode with filter wheel in datum position.

#### Safety precautions

The Filter wheel is a limited life time device. Each rotation of the filter wheel must be recorded in the instrument log book for the flight model.

## 6.8.2. Error Handling

Verification of tests is done automatically by the Test Sequence. In case of error, information on the error is logged in the TSLOG in the form

>>>> ERROR: <Error Message>

A message is displayed in both the TS-Log Window and the TS-Control Window. The Test Sequence is 'HALT'ed for the operator to indicate the action to be taken (Continue or Abort).

## WARNING!

In all cases, when an error is encountered, authorised personnel (e.g. Test Manager) **MUST** be consulted, before the test is resumed or aborted.

Correct status manually or stop TS

To continue from this point the operator has to click the 'CONT' button. No corrective action is done by the Test Sequence when continued unless explicitly stated in the message.

oject:	ХММ		N Shea	e: 2 et:	Date:
6	.8.3. Execution: Filter		Control Test _FWL_TEST.TS		
Step	Action	TC/TM	Remarks	Pass	Notes
0	Initial state: OM switched on and in operational mode KAL power line is on		Pref H4505 = 'operational'	1 435	
1	Test of filter wheel coarse command				
1.1	Command F/W to datum (tc_fw_to_datum) (tc_fw_move)	H7608 H5600			
1.2	Wait for event Examine HK	92600 90000	Pref H7010 = 'fw @ req pos' Pref H5150 = 'seen' Pref H5265 = 0		
1.3	Command F/W off coarse sensor (tc_fw_rel_steps 1000) (tc_fw_move) Wait for event	H7606 H5600 92600	Pref H290 = 1000 (dec) Pref H7010 = 'fw @ req pos'		
1.4	Examine HK	90000	Pref H5250 = 'not seen' Pref H5150 = 'seen'		
1.5	Command F/W to coarse sensor (tc_fw_to_coarse) (tc_fw_move) Wait for event	H7609 H5600 92600	Pref H7010 = 'fw @ req pos'		
1.6 2	Examine HK Test of filter wheel datum command	90000	Pref H5250 = 'seen'		
2.1	Command F/W to datum (tc_fw_to_datum) (tc_fw_move) Wait for event	H7608 H5600 92600	Pref H7010 = 'fw @ req pos'		
2.2	Examine HK	90000	Pref H5150 = 'seen' Pref H5265 = 0		
3	Exit				

	Start Time	End Time	Test Execute		
			ОК	NOK	
Comments:					
Comments:					

oject:		XMM Experiment	Issue: 2		e: 14.4.99
XMM		OM	Sheet:	54	
(05 7					
6.8.5. 1	festresult Redunda	INT Branch EH181	_FWL_IESI		
Date	Expected Time	Start Time	End Time	Test	Executed
				OK	NOK
Comments:					

S/S Resp Test Cond.	РА	ESA Representative
Date:	Date:	Date:
Sign.:	Sign.:	Sign.:

Project:	XMM Experiment	Issue:	2	Date:	14.4.99
XMM	OM	Sheet:	5	5	

# **6.9.** TestSequence 7 : Dichroic Control Test (beam deflector)

This test is performed automatically by executing the Test Sequence:

# EHIST_DIC_TEST

# 6.9.1. Test Description

#### Initial state

The OM (prime or redundant) is switched on and in an operational mode (safe, idle, science or engineering).

## **Final State**

The OM (prime or redundant) is switched on and in idle mode. The dichroic is at 'prime' interface position.

#### Safety precautions

This test procedure should be reviewed by OM personnel before first execution.

The Dichroic is a limited life time device. Each movement of the dichroic wheel must be recorded in the instrument log book for the flight model instrument.

# 6.9.2. Error Handling

Verification of tests is done automatically by the Test Sequence. In case of error, information on the error is logged in the TSLOG in the form

>>>> ERROR: <Error Message>

A message is displayed in both the TS-Log Window and the TS-Control Window. The Test Sequence is 'HALT'ed for the operator to indicate the action to be taken (Continue or Abort).

## **WARNING!**

In all cases, when an error is encountered, authorised personnel (e.g. Test Manager) **MUST** be consulted, before the test is resumed or aborted.

Correct status manually or stop TS

To continue from this point the operator has to click the 'CONT' button. No corrective action is done by the Test Sequence when continued unless explicitly stated in the message.

Project:		MM Expe	riment Issu	e: 2	Date:	14.4.99
	XMM OM		She	et:	56	
6	.9.3. Dichroic Control Tes	st (beam	deflector)			
	execute:	EHIST_E	DIC_TEST.TS			
Step	Action	EHIST_D	DIC_TEST.TS Remarks	Pass	Notes	]
Step 0	Action Initial state:				Notes	
-	Action Initial state: OM switched on and in an operational		Remarks		Notes	
-	Action Initial state:		Remarks		Notes	
-	Action Initial state: OM switched on and in an operational mode KAL power line is on OM-1 secondary rails are on		Remarks		Notes	
-	Action Initial state: OM switched on and in an operational mode KAL power line is on		Remarks		Notes	

bicp	1101011	10/101	ixemai no	1 455	10000
0	Initial state:		Pref H4505 = operational		
	OM switched on and in an operational		_		
	mode				
	KAL power line is on				
	OM-1 secondary rails are on				
0.1	Ensure mode is engineering				
	Go to idle mode	H9002	H550=0,H650=0		
	Go to engineering mode	H9004	H550=0, H650=0		
1	Test of dichroic command				
	rotate to redundant				
1.1	Set-up dichroic to redundant				
	(tc_dm_direction 1,0)	H7650	Pref H370 = 1		
			Pref H375 = 'max by sign'		
1.2	Command dichroic to move				
	(tc_dm_move)	H5650			
1.3	Examine TM	92600	Pref H7010 = 'Dichroic		
1 4		00000	pos'		
1.4	Examine HK for steps in last	90000	Pref H5275 = $32$ (dec)		
2	Test of dichroic command				
Ζ	rotate to prime				
2.1	Set-up dichroic to prime				
2.1	(tc_dm_direction -1,0)	H7650	Pref H370 = -1		
	(te_um_uncetion 1,0)	117050	Pref H375 = 'max by sign'		
2.2	Command dichroic to move		i i i i i i i i i i i i i i i i i i i		
	(tc_dm_move)	H5650			
2.3	Wait up to 20 seconds				
2.4	Examine TM (test for event)	92600	Pref H7010 = 'Dichroic		
			pos'		
2.5	Examine HK	90000	Pref H5275 = $-31$ (dec)		
3	Ensure OM is in Idle Mode	H9002	H650 = 0		
4	Exit				

The Dichroic is a limited life time device. Each movement of the dichroic wheel must be recorded in the instrument log book for the flight model instrument.

OK	NOK

Project:	XMM Experiment OM	Issue: 2 Sheet:	Date: 14.4.99

# 6.9.5. Testresult Redundant Branch EHIST_DIC_TEST

Date	Expected Time	Start Time	End Time	Test	Executed
				ОК	NOK

**Comments:** 

S/S Resp Test Cond.	PA	ESA Representative
Date:	Date:	Date:
Sign.:	Sign.:	Sign.:

Project:	XMM Exp	eriment	Issue:	2		Date:	14.4.99
XMM	ON	1	Sheet:		59		
6.10. TestSequen	ce 8 : Heater C	Control test					
This test is perfor	med automatically by exe	ecuting the Test Sequ	ience:				
	EHIST_HT	R_TEST					
6.10.1. Test De	scription						
Description							
	eaters is tested in operat heaters are cycled on/c						
Initial state	,						
	lundant) is switched on a	and in operational m	ode.				
Final State							
The OM (prime or re	lundant) is switched on a	and in operational m	ode.				
Safety precautions							
None							
6.10.2. Error H	andling						
	sts is done automatically e error is logged in the T		e. In c	case o	of err	or,	
>>>> ERROR: <	Error Message>						
	lisplayed in both the T			-	<b>a</b>	1	

A message is displayed in both the TS-Log Window and the TS-Control Window. The Test Sequence is 'HALT'ed for the operator to indicate the action to be taken (Continue or Abort).

# WARNING!

In all cases, when an error is encountered, authorised personnel (e.g. Test Manager) **MUST** be consulted, before the test is resumed or aborted.

Correct status manually or stop TS

To continue from this point the operator has to click the 'CONT' button. No corrective action is done by the Test Sequence when continued unless explicitly stated in the message.

Project:	XMM Experiment OM	Issue: Sheet:	2	60	Date: 14.4.99	

------

# 6.10.3. Execution: Heater Control test

# execute:.EHIST_HTR_TEST.TS

Step	Action	TC/TM	Remarks	Pass	Notes
0	Initial state:		Pref H4505 = operational		
	OM switched on and in operational				
	mode				
	KAL power line is on				
1	Prepare for heater switching				
1.1	Disable standard control algorithm				
	(tc_heater_stop)	H6670			
	Examine TM	91100			
	Examine HK	90000	Pref H5240 = 'offoffoffoff'		
1.2	Measure S/C +28V voltage and		report: voltage and current		
	current				
1.3	Start heater contingency task	H5660			
2	Switch-on heater 1 (Main I/F)				
	(tc_heater_config 8)	H7660	Pref H380 = 'onoffoffoff'		
2.1	Examine HK	90000	Pref H5240 = 'onoffoffoff'		
2.2	Measure S/C +28V voltage and		S/C procedure		
	current		report: voltage and current		
2.3	Compare with table 5.7-1				
2.4	Switch-off heater 1				
	(tc_heater_config 0)	H7660	Pref H380 = 'offoffoffoff'		
2.5	Examine HK	90000	Pref H5240 = 'offoffoffoff'		
3	Switch on heater 2 (forward tube)				
3.1	Switch-on heater 2				
	(tc_heater_config 4)	H7660	Pref H380 = 'offonoffoff'		
3.2	Examine HK	90000	Pref H5240 = 'offonoffoff'		
3.3	Measure S/C +28V voltage and		S/C procedure		
	current		report: voltage and current		
3.4	Compare with table 5.7-1				
3.5	Switch-off heater 2				
	(tc_heater_config 0)	H7660	Pref H380 = 'offoffoffoff'		
3.6	Examine HK	90000	Pref H5240 = 'offoffoffoff'		
4.	Switch on heater 3 (metering rods)				
4.1	Switch-on heater 3				
	(tc_heater_config 2)	H7660	Pref H380 = 'offoffonoff'		
4.2	Examine HK	90000	Pref H5240 = 'offoffonoff'		
4.3	Measure S/C +28V voltage and		S/C procedure		
	current		report: voltage and current		
4.4	Compare with table 5.7-1				
4.5	Switch-off heater 3				
	(tc_heater_config 0)	H7660	Pref H380 = 'offoffoffoff'		
4.6	Examine HK	90000	Pref H5240 = 'offoffoffoff'		

Project:			Experiment	Issue:	2		Date:	14.4.99
	XMM	(	<b>DM</b>	Sheet:		61		
5	Switch on heater 4 (secondary							
	mirror)							
5.1	Switch-on heater 4							
	(tc_heater_config 1)	H7660	Pref H380 = 'offoffoffon'					
5.2	Examine HK	90000	Pref H5240 = 'offoffoffon	,				
5.3	Measure S/C +28V voltage and		S/C procedure					
	current		report: voltage and curren	ıt				
5.4	Compare with table 5.7-1							
5.5	Switch-off heater 4	117/20	D (11200) ( ); (); (); ();					
5 (	(tc_heater_config 0) Examine HK	H7660 90000	Pref H380 = 'offoffoffoff'	"				
5.6 6		90000	Pref H5240 = 'offoffoffoff					
0	Disable heater switching Stop heater contingency task	H6660						
6.1	Measure S/C +28V voltage and	поооо						
0.1	current							
6.2	Compare with table 5.7-1		(heaters disabled)					
6.3	Enable standard control algorithm	H5670	(Interverb unsubicu)					
	(tc_heater_start)							
7	Exit							

Heater	+28V Current
1 (Main Interface)	1440mA +/- 100mA
2 (Forward tube)	1740mA +/- 100mA
3 (Metering Rods)	1060mA +/- 100mA
4 (Secondary Mirror)	950mA +/- 100mA
Disable Heater Algorithm	810mA +/- 100mA

Table 5.7-1 Heater switching power profile

XMM	X	KMM Experiment OM	Issue: 2 Sheet:	Date: 14.4.99
6.10.4. T	Sestresult Prime Br	anch EHIST	T_HTR_TEST	
Date	Expected Time	Start Time	End Time	Test Execut
				OK NOK
Comments:				
This Test NCR's, S to the Pro	t Case has been success CR's or Procedure Var ocedure.	fully performed, all criations. All required	open issues are covere Test Printouts are an	ed by nexed
S/S Re	esp Test Cond.	PA	ES Represe	A ntative
Date:		Date:	Date:	

		End Time		Execut
			ОК	NOK
Comments:				
Comments.				

Project:	XMM Experiment	Issue:	2		Date: 14.4.99
XMM	OM	Sheet:		64	

# 6.11. TestSequence 9 : Image Acquisition Test -Multiple Window (High Voltage OFF)

This test is performed automatically by executing the Test Sequence:

# EHIST_IMG_MULTI

# 6.11.1. Test Description

## Description

The function of the OM Image acquisition is tested in operational mode. A full image will be acquired and dumped to the instrument workstation. Only those areas enabled in the window table should contain events. *This version of the multiple window test does not make use of High Voltage.* 

#### Initial state

The OM (prime or redundant) is switched on and in an operational mode. OM-1 secondary rails are switched on.

#### Final State

The OM (prime or redundant) is switched on and in idle mode.

#### **Safety precautions**

The Filter wheel is a limited life time device. All movements of the filter wheel (such as occur in this test) must be recorded in the instrument log book for the flight model.

Project:
----------

**XMM** 

Issue: 2

# 6.11.2. Error Handling

Verification of tests is done automatically by the Test Sequence. In case of error, information on the error is logged in the TSLOG in the form

>>>> ERROR: <Error Message>

A message is displayed in both the TS-Log Window and the TS-Control Window. The Test Sequence is 'HALT'ed for the operator to indicate the action to be taken (Continue or Abort).

## WARNING!

In all cases, when an error is encountered, authorised personnel (e.g. Test Manager) **MUST** be consulted, before the test is resumed or aborted.

## Correct status manually or stop TS

To continue from this point the operator has to click the 'CONT' button. No corrective action is done by the Test Sequence when continued unless explicitly stated in the message.

Project:
----------

# 6.11.3. Execution: Image Acquisition Test - Multiple Window

# execute:.EHIST_IMG_MULTI.TS

Step	Action	TC/TM	Remarks	Pass	Notes
0	Initial state:		Pref H4505 = operational		
	OM switched on and in				
	engineering mode				
	KAL power line is on				
	OM-1 secondary rails are on				
1	Complete DPU reset				
1.1	Send DPU reset	H7201			
1.2	Check TM received	92201	DA_DPU_BOOT_READY		
1.3	Enable DPUOS code	H7202			
1.4	Check TM received	92202	DPU OS Ready		
1		>2202			
1.5	Enable red dsp	H7207	Pref H522 = 'Red'		
	then wait 10 seconds		Pref H16 = 'Enabled'		
1.6	Enable blue 1 dsp	H7207	Pref H522 = 'Blue1'		
	then wait 10 seconds		Pref H16 = 'Enabled'		
1.7	Enable blue 2 dsp	H7207	Pref H522 = 'Blue2'		
	then wait 10 seconds		Pref H16 = 'Enabled'		
1.8	Set Kling_on	H7206	Pref H523 = 'Blue2'		
1.0	Set Hing_on	11/200	(Alias 9203)		
1.9	Init DPU	H7248	(		
1.10	Check for event	92210	DA_EOT_INIT_DPU		
1.11	Enable Verbose	H7244	Pref H760='3' (Alias 9240)		
			Pref H16 = '1' (Alias 9010)		
2	Prepare DPU for image acquisition				
2.1	Ensure OM is in idle mode				
	(tc_mode 2)	H9002	Pref H650=0		
			H5395 = 'Idle'		
2.2	Set exposure number	H7238	Pref H530 = $1$		
3	Prepare BPE for image acquisition				
3.1	Set acquisition mode (High Res,	H7130	Pref H110 = 'Hi Res Win'		
	Windowed)				
3.2	Examine HK	90000	Pref H5215 = 'Hi Res Win'		
3.3	Set event threshold	H7131	Pref H120 = 2		
3.4	Specify centroid channel	H7100	Table 5.8-1		
	boundaries				
3.5	Load channel boundaries	H5100			
	Wait for event (2.5 minutes)	92100	H7000 = 'cen tab load'		
3.6	Specify window params	H7110	Table 5.8-2		
	Load window look-up table	H5110			
3.7	wait for event (1 minute)	92100	H7000 = 'win tab load'		
3.8	Ensure Frame Tags disabled	H7135	H16 = 'Disabled'		

roject:			Experiment	Issue:	2		D
	XMM	(	<b>DM</b>	Sheet:		67	
4	Place Filter Wheel in Blocked						
	Position. Ensure coarse and fine sensors have correct values						
4.1	(tc_fw_coarse_sensor_current 4	H7600	H300 = 4 (56  mA)				
4.2	tc_fw_fine_sensor_current 9)	H7601	H310 = 9 (25  mA)				
4.3	Specify filter wheel to datum	H7608					
4.4	Move it there.	H5600					
	Await Event	92600	H7010 = 'fw @ req pos'				
4.5	Specify move to blocked (Filt. $= 0$ )	H7604	H280 = 'Blocked'				
4.6	Move it there	H5600					
	Await Event	92600	H7010 = 'fw @ req pos'				
5	Acquire image.		•				
5.1	Ensure we are in engineering mode	H9004	H550=0,H650=0				
	(tc_mode 4).						
5.2	Turn on Flood LED (level $=3$ ).	H7134	H140 = 3 (4  uA)				
5.3	Set DPU frame time to 5 mins.	H7236	H710 = 307200 (300*10	24)			
	(ic_set_frame_time)						
5.4	Start sending events to DPU.	H5130					
5.5	Start full image eng integration	H7254	H880 = 'Full hi res'				
	(tc_enbl_eng 1,4).						
	Wait 5 minutes to acquire data						
	Await Event (DA_ENDOF_EXP).	92205					
5.6	Stop sending events to DPU	H6130					
	(failsafe command).						
5.7	Disable Flood LED (level=0)	H7134	H140 = 0 (0 mA)				
6	Await Dumping of Engineering						
	Image (2.5 hours)						
6.1	Await Event						
	DA_SENT_CMPRSSQ	92217	16 packets				
6.2	Await Event						
	DA_COMPLETE_EXP						
		92209					
7	Exit						

14.4.99

Project:

- 0

# ХММ

Date: 14.4.99

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Description	Pref	Value
Enable/Disable Verification	H10	'Enable'
X Centroid Table Boundary 0	H20	-1000
X Centroid Table Boundary 1	H21	-750
X Centroid Table Boundary 2	H22	-500
X Centroid Table Boundary 3	H23	-250
X Centroid Table Boundary 4	H24	0
X Centroid Table Boundary 5	H25	250
X Centroid Table Boundary 6	H26	500
X Centroid Table Boundary 7	H27	750
X Centroid Table Boundary 8	H28	1000
Y Centroid Table Boundary 0	H30	-1000
Y Centroid Table Boundary 1	H31	-750
Y Centroid Table Boundary 2	H32	-500
Y Centroid Table Boundary 3	H33	-250
Y Centroid Table Boundary 4	H34	0
Y Centroid Table Boundary 5	H35	250
Y Centroid Table Boundary 6	H36	500
Y Centroid Table Boundary 7	H37	750
Y Centroid Table Boundary 8	H38	1000

Table 5.8-1 Centroid Table Boundaries

	Description	Pref	Value
Enable/	Disable Verification = 1/0	H10	'Enable'
No of V	Vindows	H40	2
Xlow	Parameters for	H50	64
Ylow	Window 1	H51	15
Xsize	(Units are CCD pixels)	H52	64
Ysize		H53	64
Xlow	Parameters for	H54	216
Ylow	Window 2	H55	77
Xsize	(Units are CCD pixels)	H56	64
Ysize		H57	64
	All remaining parameters	H58-H109	0

Table 5.8-2 Window Parameters

Issue: 2

		ranch EHIST	_IMG_MULTI		
Date	Expected Time	Start Time	End Time	Test	Execut
Dutt				OK	NOK
			1	1	
Comments:					
NCR's, S	t Case has been succes SCR's or Procedure Va	sfully performed, all o riations. All required	pen issues are cover Test Printouts are an	ed by inexed	
NCR's, S	t Case has been succes SCR's or Procedure Va ocedure.	sfully performed, all o riations. All required	pen issues are covera Test Printouts are an	ed by inexed	
NCR's, S to the Pr	SCR's or Procedure Va ocedure.	sfully performed, all o riations. All required	pen issues are covere Test Printouts are an	ed by inexed	
NCR's, S to the Pr	SCR's or Procedure Va ocedure.	sfully performed, all o riations. All required	Test Printouts are an	nnexed	
NCR's, S to the Pr	SCR's or Procedure Va	riations. All required	Test Printouts are an	nnexed	

XMM	X	XMM Experiment OM	Issue: 2 Sheet:	Date: 14.4.99
6.11.5. Te	estresult Redunda	nt Branch EHIST	ſ_IMG_MULTI	
Date	Expected Time	Start Time	End Time	Test Executo
				OK NOK

S/S Resp Test Cond.	PA	ESA Representative
Date:	Date:	Date:
Sign.:	Sign.:	Sign.:

Project:	XMM Experiment	Issue:	2		Date: 14.4.99
XMM	OM	Sheet:		71	

# 6.12. TestSequence 10 : Image Acquisition Test -Full Frame (High Voltage OFF)

This test is performed automatically by executing the Test Sequence:

## EHIST_IMG_FULL

# 6.12.1. Test Description

#### Note

This script has *originally* been designed for sole use during EMC testing of the instrument *but will now be used as part of the basic IST*.

#### Description

The High voltage will not be used during this test. Data will be obtained by artificially lowering the detector threshold to 2. System noise will provide the data.

#### **Initial state**

The OM (prime or redundant) is switched on and in an operational mode (safe, idle, science or engineering).

OM-1 secondary rails are switched on.

It is assumed for the purposes of this test that the DPU has had its operating system code already loaded (this should be the case if the KAL has been left on)

## **Final state**

The OM (prime or redundant) is switched on and in engineering mode.

#### **Safety precautions**

Operation of the high voltage unit must only be performed when OM personnel are present and only in a controlled environment - irreparable damage of the detector can occur.

The Filter wheel is a limited life time device. All movements of the filter wheel (such as occur in this test) must be recorded in the instrument log book for the flight model.

Project:	XMM Experiment	Issue:	2		Date: 14.4.99
XMM	OM	Sheet:		72	

# 6.12.2. Error Handling

Verification of tests is done automatically by the Test Sequence. In case of error, information on the error is logged in the TSLOG in the form

>>>> ERROR: <Error Message>

A message is displayed in both the TS-Log Window and the TS-Control Window. The Test Sequence is 'HALT'ed for the operator to indicate the action to be taken (Continue or Abort).

#### WARNING! nen an error is encountered, author

In all cases, when an error is encountered, authorised personnel (e.g. Test Manager) **MUST** be consulted, before the test is resumed or aborted.

## Correct status manually or stop TS

To continue from this point the operator has to click the 'CONT' button. No corrective action is done by the Test Sequence when continued unless explicitly stated in the message.

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# 6.12.3. Execution: Image Acquisition Test - Full Frame

- 7-

execute:.EHIST_IMG_FULL.TS

Step	Action	TC/TM	Remarks	Pass	Notes
0	Initial state:		Pref H4505 = operational		
	OM switched on and in				
	engineering mode				
	KAL power line is on				
	OM-1 secondary rails are on				
1	Complete DPU reset				
1.1	Send DPU reset	H7201			
1.2	Check TM received	92201	DA_DPU_BOOT_READY		
1.3	Enable DPUOS code	H7202			
1.4	Check TM received	92202	DPU OS Ready		
1.5	Enable red dsp	H7207	Pref H522 = 'Red'		
	then wait 10 seconds		Pref H16 = 'Enabled'		
1.6	Enable blue 1 dsp	H7207	Pref H522 = 'Blue1'		
	then wait 10 seconds		Pref H16 = 'Enabled'		
1.7	Enable blue 2 dsp	H7207	Pref H522 = 'Blue2'		
	then wait 10 seconds		Pref H16 = 'Enabled'		
1.8	Set Kling_on	H7206	Pref H523 = 'Blue2' (Alias		
			9203)		
1.9	Init DPU	H7248			
1.10	Check for event	92210	DA_EOT_INIT_DPU		
1.11	Enable Verbose	H7244	Pref H760='3' (Alias 9240) Pref H16 = '1' (Alias 9010)		
2	Prepare DPU for image acquisition				
2.1	Ensure OM is in idle mode				
	(tc_mode 2)	H9002	Pref H650=0		
			H5395 = 'Idle'		
2.2	Set exposure number	H7238	Pref H530 = 1		
3	Prepare BPE for image acquisition				
3.1	Set acquisition mode (High Res,	H7130	Pref H110 = 'Hi Res Full'		
	Full Frame)				
3.2	Examine HK	90000	Pref H5215 = 'Hi Res Full'		
3.3	Set event threshold	H7131	Pref H120 = 2		
3.4	Specify centroid channel	H7100	Table 5.8-1		
25	boundaries Load channel boundaries	U5100			
3.5		H5100 92100	H7000 = 'app tab load'		
3.6	Wait for event (2.5 minutes)	92100	H7000 = 'cen tab load'		
5.0	Specify window params Load window look-up table	H7110	Table 5.11-1		
3.7	wait for event (1 minute)	H7110 H5110	H7000 = 'win tab load'		
3.8	Ensure Frame Tags disabled	H7135	H16 = 'disabled'		
5.0	Linsure Frame rags uisableu	11/155	1110 – uisabicu		

roject:	ХММ		Experiment	Issue: 2		Date:	14.4.9
		C	)M	Sheet:	74		
		1				]	
4	Place Filter Wheel in Blocked						
	Position.						
	Ensure coarse and fine sensors						
4 1	have correct values	117600	11200  4(5(-mA))				
4.1 4.2	(tc_fw_coarse_sensor_current 4	H7600 H7601	H300 = 4 (56  mA) H210 = 0 (25  mA)				
4.2 4.3	tc_fw_fine_sensor_current 9) Specify filter wheel to datum	H7601 H7608	H310 = 9 (25mA)				
4.5 4.4	Move it there.	H5600					
4.4	Await Event	92600	H7010 = 'fw @ req pos'				
4.5	Specify move to blocked (Filt. = $0$ )	92000 H7604	H280 = 'Blocked'				
4.6	Move it there	H5600	11200 - Diocked				
1.0	Await Event	92600	H7010 = 'fw @ req pos'				
5	Acquire image.	2000					
5.1	Ensure we are in engineering mode	H9004	H550=0,H650=0				
	(tc_mode 4).						
5.3	Set DPU frame time to 5 mins.	H7236	H710 = 307200 (300*10	24)			
	(ic_set_frame_time)			,			
5.4	Start sending events to DPU.	H5130					
5.5	Start full image eng integration	H7254	H880 = 'Full hi res'				
	(tc_enbl_eng 1,4).						
	Wait 5 minutes to acquire data						
	Await Event (DA_ENDOF_EXP).	92205					
5.6	Stop sending events to DPU						
	(failsafe command).	H6130					
6	Await Dumping of Engineering						
	Image (2.5 hours)						
6.1	Await Event						
	DA_SENT_CMPRSSQ	92217	16 packets				
6.2	Await Event						
	DA_COMPLETE_EXP						
		92209					
7	Exit						

	Description	Pref	V	alue
			Prime	Redundant
Enable	Disable Verification = 1/0	H10	'Enable'	'Enable'
No of V	Vindows	H40	1	1
Xlow	Parameters for	H50	52	64
Ylow	Window 1	H51	27	15
Xsize	(Units are CCD pixels)	H52	256	256
Ysize		H53	256	256
	All remaining parameters	H54-H109	0	0

Table 5.11-1 Window Parameters

6.12.4. To	estresult Prime Br	anch EHIST	_IMG_FULL	
Date	Expected Time	Start Time	End Time	Test Exect
				OK NOI
Comments:				
comments.				
	Case has been success CR's or Procedure Var	fully performed, all o iations. All required '	pen issues are covered Test Printouts are an	ed by inexed
NCR's, SO	ceanne			
This Test NCR's, SC to the Pro				
NCR's, SC to the Pro		РА	ES	A
NCR's, SC to the Pro	sp Test ond.	PA Date:	ES Represe Date:	A ntative

Project:	XMM Experiment	Issue:	2		Date:	14.4.99	
XMM	OM	Sheet:		76			

# 6.12.5. Testresult Redundant Branch EHIST_IMG_FULL

Date	Expected Time	Start Time	End Time	Test Executed
				OK NOK

**Comments:** 

This Test Case has been successfully performed, all open issues are covered by NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.

S/S Resp Test Cond.	PA	ESA Representative
Date:	Date:	Date:
Sign.:	Sign.:	Sign.:

Project:	XMM Experiment	Issue:	2		Date: 14.4.99
XMM	OM	Sheet:		77	

# 6.13. TestSequence 11 : Image Acquisition TestMultiple Window (High Voltage ON)

This test is performed automatically by executing the Test Sequence:

# EHIST_MULTI_HV

# 6.13.1. Test Description

#### Description

The function of the OM Image acquisition is tested in operational mode. A full image will be acquired and dumped to the instrument workstation. Only those areas enabled in the window table should contain events.

#### Initial state

The OM (prime or redundant) is switched on and in an operational mode. OM-1 secondary rails are switched on.

#### Final State

The OM (prime or redundant) is switched on and in idle mode.

#### Safety precautions

Operation of the high voltage unit must only be performed when OM personnel are present and only in a controlled environment - irreparable damage of the detector can occur.

The Filter wheel is a limited life time device. All movements of the filter wheel (such as occur in this test) must be recorded in the instrument log book for the flight model.

Under no circumstances should the instrument main power be switched off without first switching off the HVU using the script.

Project:	
----------	--

Sheet:

78

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# 6.13.2. Error Handling

Verification of tests is done automatically by the Test Sequence. In case of error, information on the error is logged in the TSLOG in the form

>>>> ERROR: <Error Message>

A message is displayed in both the TS-Log Window and the TS-Control Window. The Test Sequence is 'HALT'ed for the operator to indicate the action to be taken (Continue or Abort).

# WARNING!

In all cases, when an error is encountered, authorised personnel (e.g. Test Manager) **MUST** be consulted, before the test is resumed or aborted.

## Correct status manually or stop TS

To continue from this point the operator has to click the 'CONT' button. No corrective action is done by the Test Sequence when continued unless explicitly stated in the message.

Any abortion of the Test Sequence will leave the Spacecraft in an undefined state.

XMM	XMM Experiment OM	Issue: 2 Date: 14.4 Sheet: 79
6.13.3. Execut	ion: Image Acquisition Test - Mu	ltiple Window
	execute:.EHIST_MULTI_HV	TS

XMM		OM	Sheet:	80	
6.13.4.	Festresult Prime Br	anch EHIST	_MULTI_HV		
Date	Expected Time	Start Time	End Time	Test	Execut
	1 h 40 min			ОК	NOK
Comments:					
This Tes	st Case has been success	fully performed, all or	pen issues are covere	ed by	
NCR's, S	st Case has been success SCR's or Procedure Var rocedure.	fully performed, all op iations. All required T	ben issues are covere Fest Printouts are an	ed by inexed	
NCR's, S to the Pi	SCR's or Procedure Var rocedure.	iations. All required T	ben issues are covera Test Printouts are an	ed by nexed	
NCR's, S to the Pr S/S R	SCR's or Procedure Var rocedure. esp Test Cond.	iations. All required T	Test Printouts are an ES Represe	nexed	
NCR's, S to the Pi	SCR's or Procedure Var rocedure. esp Test Cond.	iations. All required T	Test Printouts are an	nexed	

roject: XMM		XMM Experiment OM	Issue: 2 Sheet:	Date: 14.4.99 81
	estresult Redund	ant Branch EHIST		
Date	Expected Time	Start Time	End Time	Test Executed
				OK NOK
Comments:				
Comments:				
This Test NCR's, S to the Pro-	CR's or Procedure Va	asfully performed, all o ariations. All required	pen issues are covere Test Printouts are an	ed by nexed

S/S Resp Test Cond.		ESA Representativ
Date:	Date:	Date:
Sign.:	Sign.:	Sign.:

		1					
Project:	XMM Experiment	Issue:	2		Date:	14.4.99	
XMM	OM	Sheet:		82			

# 6.14. TestSequence 12 : Image Acquisition Test -Full Frame (High Voltage ON)

This test is performed automatically by executing the Test Sequence:

# EHIST_FULL_HV

# 6.14.1. Test Description

#### Description

The function of the OM Image acquisition is tested in engineering mode. A full frame image will be acquired and dumped to the instrument work station. The filter wheel is commanded to the blocked position and the flood LED's will be used to generate events.

This script should be used in addition to tables 5.9-2 and 5.9-3 to commission the high voltage unit. Four iterations of instrument HVU being switched on and an image acquired will be needed. For each iteration, the relevant HVU operational voltages should be used (these voltages are the target voltages, the HVU must be switched on following the normal algorithm to permit these voltages to be reached). An MSSL representative will be responsible for commencing with each iteration after first having examined the data for safe background event levels.

## Initial state

The OM (prime or redundant) is switched on and in an operational mode (safe, idle, science or engineering).

OM-1 secondary rails are switched on.

## Final state

The OM (prime or redundant) is switched on and in engineering mode.

## Safety precautions

Operation of the high voltage unit must only be performed when OM personnel are present and only in a controlled environment - irreparable damage of the detector can occur.

The Filter wheel is a limited life time device. All movements of the filter wheel (such as occur in this test) must be recorded in the instrument log book for the flight model.

Project:	XMM Experiment	Issue:	2		Date: 14.4.99
XMM	OM	Sheet:		83	

# 6.14.2. Error Handling

Verification of tests is done automatically by the Test Sequence. In case of error, information on the error is logged in the TSLOG in the form

>>>> ERROR: <Error Message>

A message is displayed in both the TS-Log Window and the TS-Control Window. The Test Sequence is 'HALT'ed for the operator to indicate the action to be taken (Continue or Abort).

# WARNING!

In all cases, when an error is encountered, authorised personnel (e.g. Test Manager) **MUST** be consulted, before the test is resumed or aborted.

#### Correct status manually or stop TS

To continue from this point the operator has to click the 'CONT' button. No corrective action is done by the Test Sequence when continued unless explicitly stated in the message.

Any abortion of the Test Sequence will leave the Spacecraft in an undefined state.

ct: XMM	XMM Experiment OM	Issue: 2 Date: 14.4.9 Sheet: 84
6.14.3. Execut	tion: Image Acquisition Test - Ful	ll Frame
	0	
	execute:.EHIST_FULL_HV	.TS

	esult Prime Br	anch EHIST	[_FULL_HV	
	xpected Time	Start Time		
Comments:			End Time	Test Execut
Comments:				OK NOK
This Test Case NCR's, SCR's to the Procedu	s or Procedure Van	fully performed, all c iations. All required	open issues are covere Test Printouts are an	ed by nexed
S/S Resp. Cond	- Test	PA	ES	A
Cond Date:		Date:	Represe     Date:	ntative
Sign.:		Sign.:	Sign.:	

Project:	XMM Experiment	Issue:	2		Date: 14.4.99
XMM	OM	Sheet:		86	

# 6.14.5. Testresult Redundant Branch EHIST_FULL_HV

Date	Expected Time	Start Time	End Time	Test Executed
				OK NOK

**Comments:** 

This Test Case has been successfully performed, all open issues are covered by NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.

S/S Resp Test Cond.	РА	ESA Representative
Date:	Date:	Date:
Sign.:	Sign.:	Sign.:

		1			
Project:	XMM Experiment	Issue:	2	Date:	14.4.99
XMM	OM	Sheet:	87		

# 6.15. TestSequence 13 : Switch -OFF

This test is performed automatically by executing the Test Sequence:

# EHMOD_PWR_OFF

# 6.15.1. Test Description

#### Description

Mode and state are checked and the appropriate procedure is followed to switchoff in an orderly way.

## Initial state

The OM (prime or redundant) is switched on.

#### Final state

The OM (prime or redundant) is switched off. The KAL power lines may be left on.

#### Safety precautions

none

# 6.15.2. Error Handling

Verification of tests is done automatically by the Test Sequence. In case of error, information on the error is logged in the TSLOG in the form

## >>>> ERROR: <Error Message>

A message is displayed in both the TS-Log Window and the TS-Control Window. The Test Sequence is 'HALT'ed for the operator to indicate the action to be taken (Continue or Abort).

# WARNING!

In all cases, when an error is encountered, authorised personnel (e.g. Test Manager) **MUST** be consulted, before the test is resumed or aborted.

Correct status manually or stop TS

To continue from this point the operator has to click the 'CONT' button. No corrective action is done by the Test Sequence when continued unless explicitly stated in the message.

Any abortion of the Test Sequence will leave the Spacecraft in an undefined state.

Pi

		i				
Project:	XMM Experiment	Issue:	2		Date:	14.4.99
XMM	OM	Sheet:		88		

# 6.15.3. Execution: Switch - OFF

# execute:.EHMOD_PWR_OFF.TS

Step	Action	TC/TM	Remarks	Pass	Note
0	T. 21-1 - 4 - 4				S
0	Initial state:				
	OM switched on				
	KAL power line is on				
1	Check ICU state		H5405		
	if mode				
	= Operational		goto step 2		
	= Basic		goto step 3		
2.0	If HV enabled:	90000	H5145 = 1 = `Enabled'		
	Ramp down HV				
	(Warning, these commands are				
	hazardous)				
2.1	Specify Vcathode Ramp.	H7140	H150='cathode',H160=0,		
			H175='off'		
2.2	Perform Ramp.	H5140			
	Await Event.	92100	H7000 = 'cathode ok'		
2.3	Specify Vmcp1 Ramp.	H7140	H150='mcp1',H160=0,		
			H175='off'		
2.4	Perform Ramp.	H5140			
	Await Event.	92100	H7000 = 'mcp1  ok'		
2.5	Specify Vmcp23 Ramp.	H7140	H150='mcp23',H160=0,		
			H175='off'		
2.6	Perform Ramp.	H5140			
	Await Event.	92100	H7000 = 'mcp23  ok'		
	Examine HK	90000	H5145='Disabled'		
3.1	Switch off OM-1 secondary rails	H6690			
3.2	Disable heater algorithm	H6670			
4	Stop ICU				
4.1	Disable Watchdog for RBI	H6510			
4.2	suspnd	D7203			
	Send RBI suspend command				
5	Switch-off +28V power		S/C procedure		
	L		report: voltage and current		
6	Switch-off KAL		S/C procedure		
~			report: voltage and current		
7	Exit		interport. voltage and current		1

5 min       OK       NOI         Comments:         This Test Case has been successfully performed, all open issues are covered by NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.         S/S Resp Test       PA       ESA         Date:       Date:       Date:	ect: XMM	2	XMM Experiment OM	Issue: 2 Sheet:	Date: 14.4.99
5 min       OK       NOI         Comments:         This Test Case has been successfully performed, all open issues are covered by NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.         S/S Resp Test       PA       ESA         Cond.       PA       Representative         Date:       Date:       Date:	6.15.4. T	estresult Prime Bı	anch EHMC	DD_PWR_OFF	
Comments:         This Test Case has been successfully performed, all open issues are covered by NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.         S/S Resp Test       PA       ESA         Cond.       PA       ESA         Date:       Date:       Date:	Date	Expected Time	Start Time	End Time	Test Execut
This Test Case has been successfully performed, all open issues are covered by NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.         S/S Resp Test       PA       ESA         Cond.       Representative         Date:       Date:		5 min			OK NOK
This Test Case has been successfully performed, all open issues are covered by NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.         S/S Resp Test       PA       ESA         Cond.       Representative         Date:       Date:	Comments:				
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.S/S Resp Test Cond.PAESA RepresentativeDate:Date:Date:	Commentus.				
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.S/S Resp Test Cond.PAESA RepresentativeDate:Date:Date:					
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.S/S Resp Test Cond.PAESA RepresentativeDate:Date:Date:					
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.S/S Resp Test Cond.PAESA RepresentativeDate:Date:Date:					
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.S/S Resp Test Cond.PAESA RepresentativeDate:Date:Date:					
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.S/S Resp Test Cond.PAESA RepresentativeDate:Date:Date:					
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.S/S Resp Test Cond.PAESA RepresentativeDate:Date:Date:					
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.S/S Resp Test Cond.PAESA RepresentativeDate:Date:Date:					
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NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.S/S Resp Test Cond.PAESA RepresentativeDate:Date:Date:					
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.S/S Resp Test Cond.PAESA RepresentativeDate:Date:Date:					
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.S/S Resp Test Cond.PAESA RepresentativeDate:Date:Date:					
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.S/S Resp Test Cond.PAESA RepresentativeDate:Date:Date:					
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.S/S Resp Test Cond.PAESA RepresentativeDate:Date:Date:					
NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.S/S Resp Test Cond.PAESA RepresentativeDate:Date:Date:					
Date: Date: Date:	NCR's, S	CR's or Procedure Van	fully performed, all o riations. All required	pen issues are covere Test Printouts are an	ed by nexed
Date: Date: Date:	S/S Re	esp Test	РА	ES	A
		ona.	Date:		ntative
Sign.: Sign.: Sign.:	1				

Project:	XMM Experiment	Issue:	2		Date: 14.4.99
XMM	ΟΜ	Sheet:		90	

# 6.15.5. Testresult Redundant Branch EHMOD_PWR_OFF

Date	Expected Time	Start Time	End Time	Test	Executed
				OK	NOK
				<b>UIX</b>	

**Comments:** 

This Test Case has been successfully performed, all open issues are covered by NCR's, SCR's or Procedure Variations. All required Test Printouts are annexed to the Procedure.

S/S Resp Test Cond.	PA	ESA Representative
Date:	Date:	Date:
Sign.:	Sign.:	Sign.:

Project:	XMM Experiment	Issue: 2 Date: 14.4.99
XMM	OM	Sheet: 91
7. CONTINGE	NCY PROCEDURES	
	ICT TROCEDURES	
ERROR! NOT A V	ALID FILENAME.	

XMM	ОМ	Sheet: 92
S/C CONFIG	URATION STATUS LIS	r/ Refedence
S/C CONFIG	UKATION STATUS LIS	I/ KEFEKENCE

Project:	XMM Experiment	Issue: 2	Date: 14.4.99
XMM	OM	Sheet: 93	
	<u>T-OFF SHEET</u> nted System Test for <i>XMM</i> Expen	riment	
	(Shadad area MUST ha filled)		
Test Manager:	(Shaded area MUST be filled)	Date:	Signature:
Test Manager: Test Conductor	Name:	Date: Date:	Sionature: Sionature:
	r-1: Name:		
Test Conductor	Name:           r-1:         Name:           r-2:         Name:	Date:	Signature:
Test Conductor Test Conductor	Name:           r-1:         Name:           r-2:         Name:           r-3:         Name:	Date:	Sionature: Sionature:
Test Conductor Test Conductor Test Conductor	Name:           r-1:         Name:           r-2:         Name:           r-3:         Name:           r-4:         Name:	Date: Date: Date:	Sionature: Sionature: Sionature:

Name:

Date

Signature

ESA Representative:

	Test Summary	
N	D. (	<u> </u>
Name:	Date:	Signature:

oject: XMM	XMM Experiment OM	Issue: 2 Date: 14.4. Sheet: 94	99
<b>10. ANNEX 1 TS</b>	<u>S LOG FILE PRINTS</u>		